What's your E2IQ?

ENERGY LEARN

FACT SHEET

Key Terms

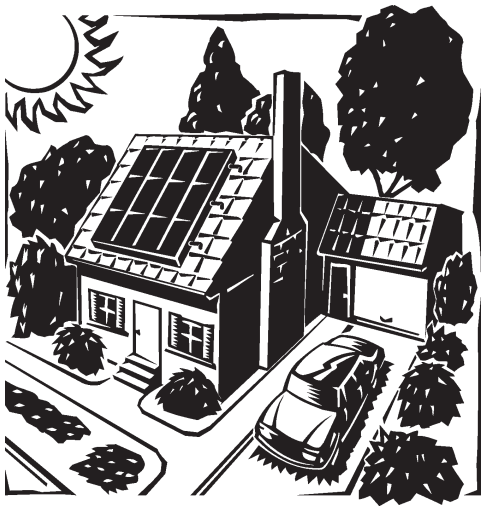
- Active Solar Home
- Photovoltaic Electricity
- Silicon
- Solar Collector
- Space Heating
- Solar Thermal System

Solar Energy Facts

- Every day, the sun radiates (sends out) an enormous amount of energy – in fact, it radiates more energy in one second than the world has used since time began.
- The S.C. Energy Office in partnership with the Million Solar Roofs Initiative is encouraging communities and businesses to install 1 million solar energy systems across the United States by 2010. The initiative includes two types of solar technology: (1) solar thermal systems, which produce heat for hot water; and (2) photovoltaic systems, which convert sunlight into electricity. South Carolina is doing its part to meet the goal of 500 solar energy systems installed in the state by 2010.

Solar Energy

What is solar energy?



Everyday, the sun radiates (sends out) an enormous amount of energy. It radiates more energy in one hour than everyone in the world can use in a year. This energy comes from within the sun itself. Like most stars, the sun is a big gas ball made up mostly of hydrogen and helium gas. The sun makes energy in its inner core in a process called nuclear fusion.

Only a small part of the solar energy that the sun radiates into space ever reaches the earth, but that is more than enough to supply all our energy needs. Every day, enough solar energy reaches the earth to supply our nation's energy needs for a year. It takes the sun's energy just a little more than eight minutes to travel the 93 million miles to earth. Solar energy travels at a speed of 186,000 miles per second, the speed of light. Today, people use solar energy to heat buildings and water and to generate electricity.

Heating with solar energy is not as easy as you might think. Capturing sunlight and putting it to work is difficult because the solar energy that reaches the earth is spread out over a large area. The sun does not deliver that much energy to any one place at any one time. The amount of solar energy an area receives depends on the time of day, the season of the year, the cloudiness of the sky and how close you are to the earth's equator.

A *solar collector* is one way to capture sunlight and change it into usable heat energy. A closed car on a sunny day is like a solar collector. As sunlight passes through the car's windows, it is absorbed by the seat covers, walls and floor of the car. The absorbed light changes into heat. The car's windows let light in, but they don't let all the heat out. A closed car can get very hot.

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Solar Space Heating

Space heating means heating the space inside a building. Today, many homes use solar energy for space heating. A passive solar home is designed to let in as much sunlight as possible. It is like a big solar collector.

Sunlight passes through the windows and heats the walls and floor inside the house. The light can get in, but the heat is trapped inside. A passive solar home does not depend on mechanical equipment, such as pumps and blowers to heat the house.

An *active solar home,* on the other hand, uses special equipment to collect sunlight. An active solar house may use special collectors that look like boxes covered with glass. These collectors are mounted on the rooftop facing south to take advantage of the winter sun. Dark-colored metal plates inside the boxes absorb sunlight and change it into heat. (Black absorbs sunlight more than any other color.) Air or water flows through the collector and is warmed by the heat. The warm air or water is distributed to the rest of the house, just as it would be with an ordinary furnace system.

Solar Water Heating

Solar energy can be used to heat water. Heating water for bathing, dish washing and clothes washing is the second biggest home energy cost. A solar water heater works a lot like a solar space heater. In our hemisphere, a solar collector is mounted on the south side of a roof where it can capture sunlight. The sunlight heats water in a tank. The hot water is piped to faucets throughout a house, just as it would be with an ordinary water heater. Today, more than 1.5 million homes in the U.S. use solar water heaters.

Solar Electricity

Solar energy can also be used to produce electricity. Two ways to make electricity from solar energy are photovoltaics and solar thermal systems.

- ***Photovoltaic Electricity*** - Photovoltaic comes from the words photo, meaning light, and volt, a measurement of electricity. Sometimes photovoltaic cells are called PV cells or solar cells for short. You are probably familiar with photovoltaic cells. Solar-powered toys, calculators and roadside telephone call boxes all use solar cells to convert sunlight into electricity. Solar cells are made up of *silicon,* the same substance that makes up sand. Silicon is the second most common substance on earth. Solar cells can supply energy to anything that is powered by batteries or electrical power. Electricity is produced when sunlight strikes the solar cell, causing the electrons to move around. The action of the electrons starts an electric current. The conversion of sunlight into electricity takes place silently and instantly. There are no mechanical parts to wear out.

- ***Solar Thermal Electricity*** - Like solar cells, *solar thermal systems* use solar energy to produce electricity, but in a different way. Most solar thermal systems use a solar collector with a mirrored surface to focus sunlight onto a receiver that heats a liquid. The super-heated liquid is used to make steam to produce electricity in the same way that coal plants do. Solar energy has great potential for the future. Solar energy is free and its supplies are unlimited. It does not pollute or damage the environment. It cannot be controlled by any one nation or industry. If we can improve the technology to harness the sun's enormous power, we may never face energy shortages again.

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